LISTING OF THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application:

1. (Currently Amended) An arrangement for controlling a combustion engine ~~whereby~~ wherein

the combustion engine ~~(1)~~ comprises a combustion chamber ~~(3)~~, a movable piston in the combustion chamber and the piston being movable ~~(4) adapted~~ to ~~compressing~~ compress a fuel mixture in the combustion chamber ~~(3)~~ so that self-ignition of the fuel mixture takes place, a crankshaft ~~(5)~~ connected to and driven by movements of the piston; ~~(4),~~

an inlet valve ~~(8)~~ to the combustion chamber ~~(3)~~ and an exhaust valve ~~(11)~~ from the combustion chamber; ~~(3), which arrangement comprises~~

a control unit operable for ~~(19) adapted to~~ controlling the self-ignition of the fuel mixture to an optimum crankshaft angle (cad_{iopt}) of the crankshaft within a load range (L_{tot}), ~~characterised in that said~~ wherein the load range (L_{tot}) ~~can be~~ is divided into at least two subranges (L_{II}, L_{III}) and the control unit ~~(19)~~ is ~~adapted to~~ operable for controlling the self-ignition of the fuel mixture towards ~~an~~ the optimum crankshaft angle (cad_{iopt}) of the crankshaft within a first one of ~~said~~ the subranges (L_{II}) by ~~means of~~ a strategy (II) ~~which entails~~ of varying the effective compression ratio (c) in the cylinder ~~(2) being varied~~ within a range bounded downwards by a lowest acceptable compression ratio ©$_{min}$), and within a second ~~subrange~~ one of the subranges (L_{III}) by ~~means of~~ a strategy (III) which entails leading cooled exhaust gases (ceg) ~~being led~~ to the combustion chamber ~~(3)~~ in a quantity ~~such that it becomes possible~~ also enabling within the second subrange (L_{III}) ~~to~~ control of the self-ignition of the fuel mixture towards ~~an~~ the optimum crankshaft angle (cad_{iopt}) of the crankshaft by variation of the effective compression ratio (c) within the range bounded downwards by the lowest acceptable compression ratio ©$_{min}$).

2. (Currently Amended) An arrangement according to claim 1, wherein ~~characterised in that~~ the control unit ~~(19)~~ is adapted to regulating the effective compression ratio (c) in the cylinder ~~(2)~~ by initiating variable closure of the inlet valve ~~closure~~ (ivc).

3. (Currently Amended) An arrangement according to ~~any one of the foregoing claims, characterised in that the arrangement comprises~~ claim 2, further comprising a hydraulic control system ~~(18a)~~ operable for controlling the variable inlet valve closure (ivc).

4. (Currently Amended) An arrangement according to ~~any one of the foregoing claims, characterised in that the arrangement comprises a return line (13) extending from~~ claim 1, further comprising an exhaust line ~~(12)~~ of the combustion engine from the exhaust valve ~~to~~ an inlet line ~~(7)~~ to the inlet valve for air supply to the combustion chamber, and a return line extending from the exhaust line to the inlet line ~~(3)~~.

5. (Currently Amended) An arrangement according to claim 4, ~~characterised in that said~~ wherein the return line ~~(13)~~ comprises a valve ~~(14)~~ for controlling the supply of exhaust gases to the inlet line ~~(7)~~.

6. (Currently Amended) An arrangement according to claim ~~3 or 5, characterised in that~~ 4, wherein the return line ~~(13)~~ further comprises a cooler ~~(15)~~ operable for cooling the exhaust gases before they reach the inlet line ~~(7)~~.

7. (Currently Amended) An arrangement according to ~~any one of the foregoing claims, characterised in that the arrangement comprises~~ claim 1, further comprising a first sensor ~~(16)~~ for detecting a parameter (p) which indicates the start of a combustion process in the combustion chamber ~~(3)~~, and a second sensor ~~(17)~~ for estimating the crankshaft angle (cad) of the crankshaft ~~combustion engine (1)~~, and the control unit ~~(19)~~ is ~~adapted to~~ operable for determining the crankshaft angle (cad_i) for the start of the combustion process.

8. (Currently Amended) An arrangement according to claim 7, ~~characterised in that said~~ wherein the first sensor is a pressure sensor ~~(16) which detects~~ operable for detecting the pressure (p) in the combustion chamber ~~(3)~~.

9. (Currently Amended) An arrangement according to claim 7, wherein ~~or 8, characterised in that~~ the control unit ~~(19) is adapted to~~ is operable for comparing the estimated crankshaft angle (cad_i) at the self-ignition of the combustion process with stored information concerning the optimum crankshaft angle (cad_{iopt}) for self-ignition of the combustion process and ~~to~~ for using that information for controlling the self-ignition of the following combustion process.

10. (Currently Amended) An arrangement according to ~~any one of the foregoing claims, characterised in that the arrangement comprises~~ claim 1, further comprising an injection nozzle operable ~~(10)~~ for injecting fuel ~~injection~~ into the combustion chamber ~~(3)~~ when the inlet valve ~~(8)~~ is open.

11. (Currently Amended) A method for controlling a combustion engine ~~whereby~~ wherein the combustion engine ~~(1)~~ comprises a combustion chamber ~~(3)~~, a movable piston ~~(4) adapted to compressing~~ in the combustion chamber and the piston being movable to compress a fuel mixture in the combustion chamber ~~(3)~~ so that self-ignition of the fuel mixture takes place, a crankshaft connected to and ~~(5)~~ driven by movements of the piston; ~~(4),~~

an inlet valve ~~(8)~~ to the combustion chamber ~~(3)~~ and an exhaust valve ~~(11)~~ from the combustion chamber;

~~(3), which~~ the method ~~comprises the step of~~ comprising:

controlling the self-ignition of the fuel mixture towards an optimum crankshaft angle (cad_{iopt}) of the crankshaft within a load range (L_{tot}), ~~characterised in~~ that is ~~said load range (L_{tot}) can be~~ divided into at least ~~two~~ first and second subranges (L_{II}, L_{III}); ~~and the method comprises the steps of~~ controlling the self-ignition of the fuel mixture towards ~~an~~ the optimum crankshaft angle (cad_{iopt}) within ~~one of said subranges~~ the first subrange (L_{II}) by ~~means of~~ a strategy (II) ~~which entails~~ of varying the effective compression ratio (c) in the cylinder ~~(2) being varied~~ within a range bounded downwards by a lowest acceptable compression ratio ($©_{min}$), and within the second subrange (L_{III}) by ~~means of~~ a strategy (III) ~~which entails~~ of leading cooled exhaust gases (ceg) ~~being led~~ to the combustion chamber ~~(3)~~ in a quantity ~~such that it becomes possible~~ also enabling within the second

subrange (L_{III}) ~~to~~ control of the self-ignition of the fuel mixture towards ~~an~~ the optimum crankshaft angle (cad_{iopt}) of the crankshaft by variation of the effective compression ratio (c) within the range bounded downwards by the lowest acceptable compression ratio $©_{min}$).

12. (Currently Amended) A method according to claim 11, further comprising ~~characterised by the step of~~ regulating the effective compression ratio in the cylinder ~~(2)~~ by initiating variable inlet valve closure (ivc).

13. (Currently Amended) A method according to claim 12, ~~characterised by the step of~~ further comprising controlling the variable inlet valve closure (ivc) by ~~means of~~ a hydraulic control system ~~(18a)~~.

14. (Currently Amended) A method according to ~~any one of claims 11-13 above, characterised by the step of~~ claim 11, further comprising leading ~~said~~ cooled exhaust gases (ceg) to the combustion chamber ~~(3)~~ via a return line ~~(13)~~ extending from an exhaust line ~~(12)~~ of the combustion engine from the exhaust valve to an inlet line to the inlet valve ~~(7)~~ for air supply to the combustion chamber ~~(3)~~.

15. (Currently Amended) A method according to claim 14, ~~characterised by the step of~~ further comprising valve controlling the supply of exhaust gases to the inlet line ~~(7) by means of a valve (14)~~.

16. (Currently Amended) A method according to claim 14, further comprising ~~or 15, characterised by the step of~~ cooling the exhaust gases before they reach the inlet line ~~(7) by means of a cooler (15)~~.

17. (Currently Amended) A method according to ~~any one of claims 11-16 above, characterised by the steps of~~ claim 11, further comprising determining the crankshaft angle (cad_i) at the start of the combustion process by detecting a parameter (p) which is related to the combustion

process in the combustion chamber ~~(3)~~, and ~~of~~ by detecting the crankshaft angle (cad) of the combustion engine ~~(1)~~.

18. (Currently Amended) A method according to claim 17, ~~characterised in that said~~ wherein the parameter detected is the pressure (p) in the combustion chamber ~~(3)~~.

19. (Currently Amended) A method according to claim 17, further comprising ~~or 18, characterised by the steps of~~ comparing the estimated crankshaft angle (cad_i) at the start of the combustion process with stored information concerning the optimum crankshaft angle (cad_{iopt}) for the start of the combustion process, and ~~of~~ using that information for controlling the self-ignition of the following combustion process.

20. (Currently Amended) A method according to ~~any one of claims 11-19 above, characterised by the step of~~ claim 11, further comprising injecting fuel into the combustion chamber ~~(3) via an injection nozzle (10)~~ when the inlet valve ~~(8)~~ is open.